Introduction to Algebra

Exercise 8.1

Question: 1

Write the following using numbers, literals and signs of basic operations. State what each letter represents:

(i) The diameter of a circle is twice its radius.

(ii) The area of a rectangle is the product of its length and breadth.

(iii) The selling price equals the sum of the cost price and profit.

(iv) The total amount equals the sum of the principal and the interest.

(v) The perimeter of a rectangle is two times the sum of its length and breadth.

(vi) The perimeter of a square is four times its side.

Solution:

(i) Let r and d be the radius and diameter of the circle, respectively.

Therefore, $d = 2r$

(ii) Let l and b be the length and breadth of the rectangle, respectively.

Therefore, area of rectangle = lb

(iii) Let s, c and p be the selling price, cost price and profit, respectively.

Therefore, $s = c + p$

(iv) Let T, p and i be the total amount, principal and interest, respectively.

Therefore, $T = p + i$

(v) Let land b be the length and breadth of the rectangle, respectively.

Therefore, perimeter of rectangle = 2(l + b)

(vi) Let a be the side of the square.

Therefore, perimeter of the square = 4a

Question: 2

Write the following using numbers, literals and signs of basic operations:

(i) The sum of 6 and x.

(ii) 3 more than a number y.

(iii) One- third of a number x.

(iv) One- half of the sum of number x and y.

(v) Number y less than a number 7.

(vi) 7 taken away from x.

(vii) 2 less than the quotient of x by y

(viii) 4 times x taken away from one-thirs of y.

(ix) Quotient of x by 3 is multiplies by y.

Solution:

(i) The sum of 6 and x is $6 + x$.

(ii) 3 more than a number y means $y + 3$.

(iii) One-third of a number x is $x/3$.

(iv) One-half of the sum of numbers x and y is $(x + y)/2$.

(v) Number y less than a number 7 means $7 – y$.

(vi) 7 taken away from x means $x – 7$.

(vii) 2 less than the quotient of x by y is $x/y – 2$.

(viii) 4 times x taken away from one-third of y is $y/3 – 4x$.

(ix) Quotient of x by 3 is multiplied by y means: $xy/3$

Question: 3

Think of a number. Multiply it by 5. Add 5 to the result. Subtract y from this result. What is the result?

Solution:

Let the number be x.

On multiplying the number by 5. We get: 5x

Further, adding 6 to 5x. We get: 5x + 6

Finally, on subtracting y from 5x + 6,

We get: 5x + 6 – y

Question: 4

The number of rooms on the ground floor of a building is 12 less than the twice of the numbers of rooms on the first floor. If the first floor has x rooms, how many rooms does the ground floor has?

Solution:

Let the number of rooms on the ground floor be y.

It is given that the number of rooms on the first floor is x; therefore, we have:

$y = 2 \times x - 12$

$= 2x - 12$

Thus, the number of rooms on the ground floor is 2x – 12.

Question: 5

Binny spends Rs. A daily and saves Rs. B per week. What is her income for 2 weeks?

Solution:

It is given that Binny spends Rs. a in one day.

Money spent by him in one week = $7 \times a = 7a$

It is further given that he saves Rs. b in one week; therefore we have:

Total income in one week = Total expenditure in one week + Total saving in one week

$= 7a + b$

Therefore, Binny’s total income in 2 weeks = 2 X (7a + b)

= Rs. (14a + 2b)

Question: 6

Rahul score 80 marks in English and x marks in Hindi. What is his total scores in the two subjects?

Solution:

Marks obtained in English = 80

Marks obtained in Hindi = x

Total marks obtained = 80 + x

Question: 7

Rohit covers x centimeters in one step. How much distance does he covers in y steps?

Solution:

It is given that Rohit covers x cm in one step.

Therefore, distance covered by him in y steps = x×y = x y cm

Question: 8

One apple weighs 75 grams and one orange weighs 40 grams. Determine the weight of x apples an y oranges.

Solution:

Weight of an apple = 75 grams

Wright of an orange = 40 grams

Weight of x apples = 75 X x = 75x grams

Weight of y oranges = 40 X y = 40y grams

Total weight of x apples and y oranges = (75x + 40y) grams

Question: 9

One pencil costs Rs. 2 and one fountain pen costs Rs. 15. What is the cost of x pencils and y fountain pens?

Solution:

Cost of one pencil = Rs. 2

Cost of x pencils = Rs. 2x

Cost of one fountain pen = Rs. 15

Cost of y fountain pens = Rs. 15y

Total cost of x pencils and y fountain pens = Rs. (2x + 15y)

Exercise 8.2

Question: 1

Write each of the following products into exponential form:

(i) a × a × a × a × . . . 15 times

(ii) 8 × b × b × b × a × a × a × a

(iii) 5 × a × a × a × b × b × c × c × c

(iv) 7 × a × a × a… 8 times × b × b × b ×.. . 5 times

(v) 4 × a × a × a ×. . . . 5 times × b × b × . . . 12 times × c × c × c . . . 15 times

Solution:

(i) a^{15}

(ii) $8a^4b^3$

(iii) $5a^3b^2c^3$

(iv) $7a^8b^5$

(v) $4a^5b^{12}c^{15}$

Question: 2

Write each of the following in the product form:

(i) a^2b^5

(ii) $8x^3$

(iii) $7a^3b^4$

(iv) $15a^9b^8c^6$

(v) $30x^4y^4z^5$

(vi) $43p^{10}q^5r^{15}$

(vii) $17p^{12}q^{20}$

Solution:

(i) $a \times a \times b \times b \times b \times b \times b$

(ii) $8 \times x \times x \times x$

(iii) $7 \times a \times a \times a \times b \times b \times b \times b$

(iv) $15 \times a \times a \times a \times$. . . 9 times $\times b \times b \times b \times$ . . . 8 times

(v) $30 \times x \times x \times x \times x\, y \times y \times y \times y \times z \times z$ … 5 times

(vi) $43 \times p \times p$ ….. 10 times $\times q \times q$ … 5 times $\times r \times r$ ….. 15 times

(vii) $17 \times p \times p$ … 12 times $\times q \times q$ … 20 times

Question: 3

Write down each of the following in the exponential form:

(i) $4a^3 \times 6ab^2 \times c^2$

(ii) $5xy \times 3x^2y \times 7y^2$

(iii) $a^3 \times 3ab^2 \times 2a^2b^2$

Solution:

(i) $24a^4b^2c^2$

(ii) $105x^3y^4$

(iii) $6a^6b^4$

Question: 4

The number of bacteria in a culture is x now. It becomes square of itself after one week. What will be its number after two weeks?

Solution:

Present number of bacteria in a culture = x

Number of bacteria in the culture after one week = x^2

Number of bacteria in the culture after two weeks = $(x^2)^2 = x^4$

Question: 5

The area of a rectangle is given by the product of its length and breadth. The length of a rectangle is two-thirs of its breadth. Find its area if its breadth is x cm.

Solution:

Breadth of the given rectangle = x cm

Length of the rectangle = 23 x cm

Area of the rectangle = $23x \times x = 23\ cm^2$

Question: 6

If there are x rows of chairs and each row contains x^2 chairs. Determine the total numbers of chairs.

Solution:

Total number of chairs = Number of rows × Number of chairs in each row

$= x \times x^2 = x^3$

Exercise 8.3

Question: 1

5 more than twice a number x is written as:

(a) 5 + x + 2

(b) 2x + 5

(c) 2x – 5

(d) 5x + 2

Solution:

(b) 2x + 5

Question: 2

The quotient of x by 2 is written as:

(a) $\frac{x}{2}+5$

(b) $\frac{2}{x}+5$

(c) $\frac{x+2}{5}$

(d) $\frac{x}{2+5}$

Solution:

(a) $\frac{x}{2}+5$

Question: 3

The quotient of x by 3 is multiplied by y is written as:

(a) x/3y

(b) 3x/y

(c) 3y/x

(d) xy/3

Solution:

(d) xy/3

Question: 4

9 taken away from the sum of x and y is

(a) x + y – 9

(b) 9 – (x + y)

(c) $\frac{x+y}{9}$

(d) $\frac{9}{x+y}$

Solution:

(a) x + y – 9

Question: 5

The quotient of x by y added to the product of x and y is written as:

(a) $\frac{x}{y}+xy$

(b) $\frac{y}{x}+xy$

(c) $\frac{xy+x}{y}$

(d) $\frac{xy+y}{x}$

Solution:

(a) $\frac{x}{y}+xy$

Question: 6

$a^2b^3 \times 2ab^2$ is equal to

(a) $2a^3b^4$

(b) $2a^3b^5$

(c) $2ab$

(d) a^3b^5

Solution:

(b) $2a^3b^5$

Question: 7

$4a^2b^3 \times 3ab^2 \times 5a^3b$ is equal to

(a) $60a^3b^5$

(b) $60a^6b^5$

(c) $60a^6b^6$

(d) a^6b^6

Solution:

(c) $60a^6b^6$

Question: 8

If $2x^2y$ and $3xy^2$ denote the length and breadth of a rectangle, then its area is

(a) $6xy$

(b) $6x^2y^2$

(c) $6x^3y^3$

(d) x^3y^3

Solution:

(c) $6x^3y^3$

Question: 9

In a room there are x^2 rows of chairs and each rows contains $2x^2$ chairs. The total number of chairs in the room is

(a) $2x^2$

(b) $2x^4$

(c) x^4

(d) $\frac{x^4}{4}$

Solution:

(b) $2x^4$

Question: 10

$a^3 \times 2a^2b \times 3ab^5$ is equal to

(a) a^6b^6

(b) $23a^6b^6$

(c) $6a^6b^6$

(d) None of these

Solution:

(b) $2x^4$